



# Oroville Facilities Relicensing Engineering and Operations Work Group

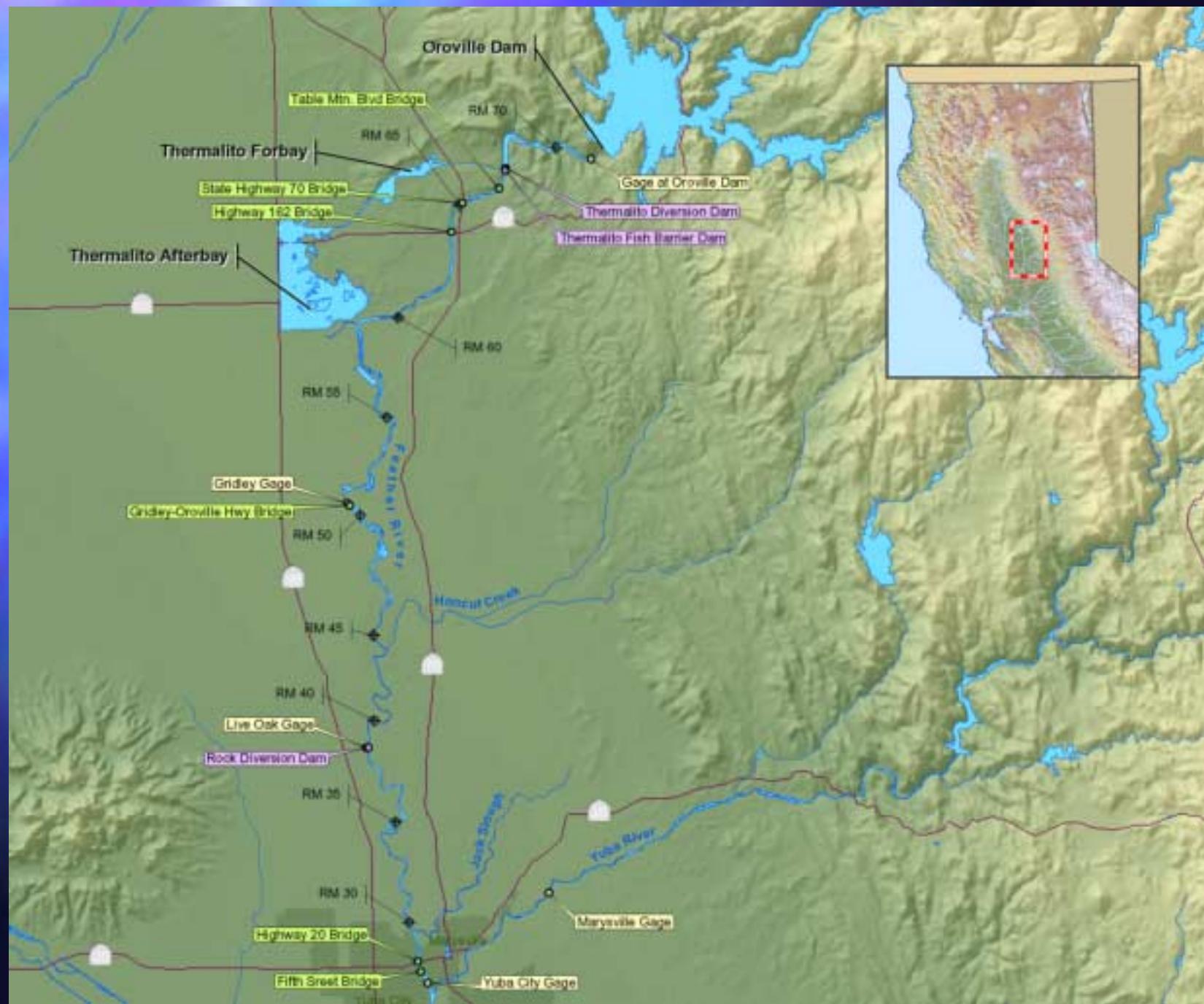
April 25, 2003

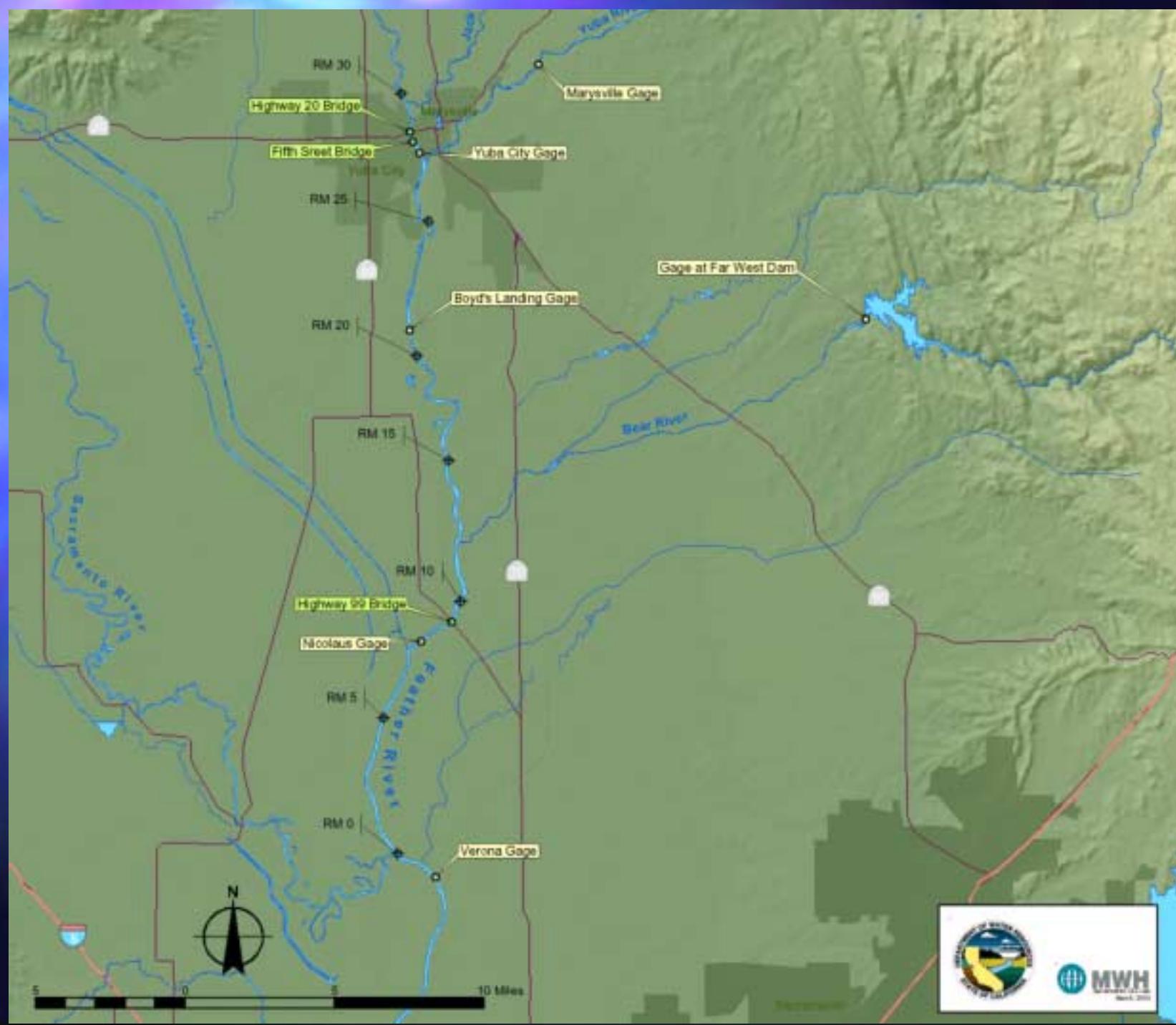
Flow-Stage Modeling

# Information Sources

- U.S. Army Corps of Engineers Sacramento-San Joaquin Basins Comprehensive Study
  - Topographic and hydrographic data collected on Feather River in 1997 and 1998
  - Cross sections cut from topo data by COE
- Flow-stage records at gages along river







# Gages Used for Calibration

Gage Name	CDEC Gage ID	Approximate River Mile	River Basin
Gage at Oroville Dam	ORO	71.5	Feather River
Gridley Gage	GRL	50.64	Feather River
Live Oak Gage	FLO	38.99	Feather River
Yuba City Gage	YUB	27.50	Feather River
Boyd's Landing Gage	FBL	20.75	Feather River
Bear River at Camp Far West Dam	CFW	N/A <sup>1</sup>	Bear River
Marysville Gage	MRY	2.0 <sup>2</sup>	Yuba River
Nicolaus Gage	NIC	8.25	Feather River
Verona Gage	VON	79.25	Sacramento River

# Other Information Sources

- As-built drawings
  - inline weirs
  - bridges
- Aerial photos
  - rock diversion dam
  - riffle below Yuba Gage
- Bridge data developed for FEMA study

# **Revisions to Model**

- Remove tributaries and combine reaches
- Add weirs
  - Thermalito Diversion Dam
  - Fish Barrier Dam
  - Rock Diversion Dam (RM 38.76)
- Add bridge data
- Cross section modifications
  - levee points

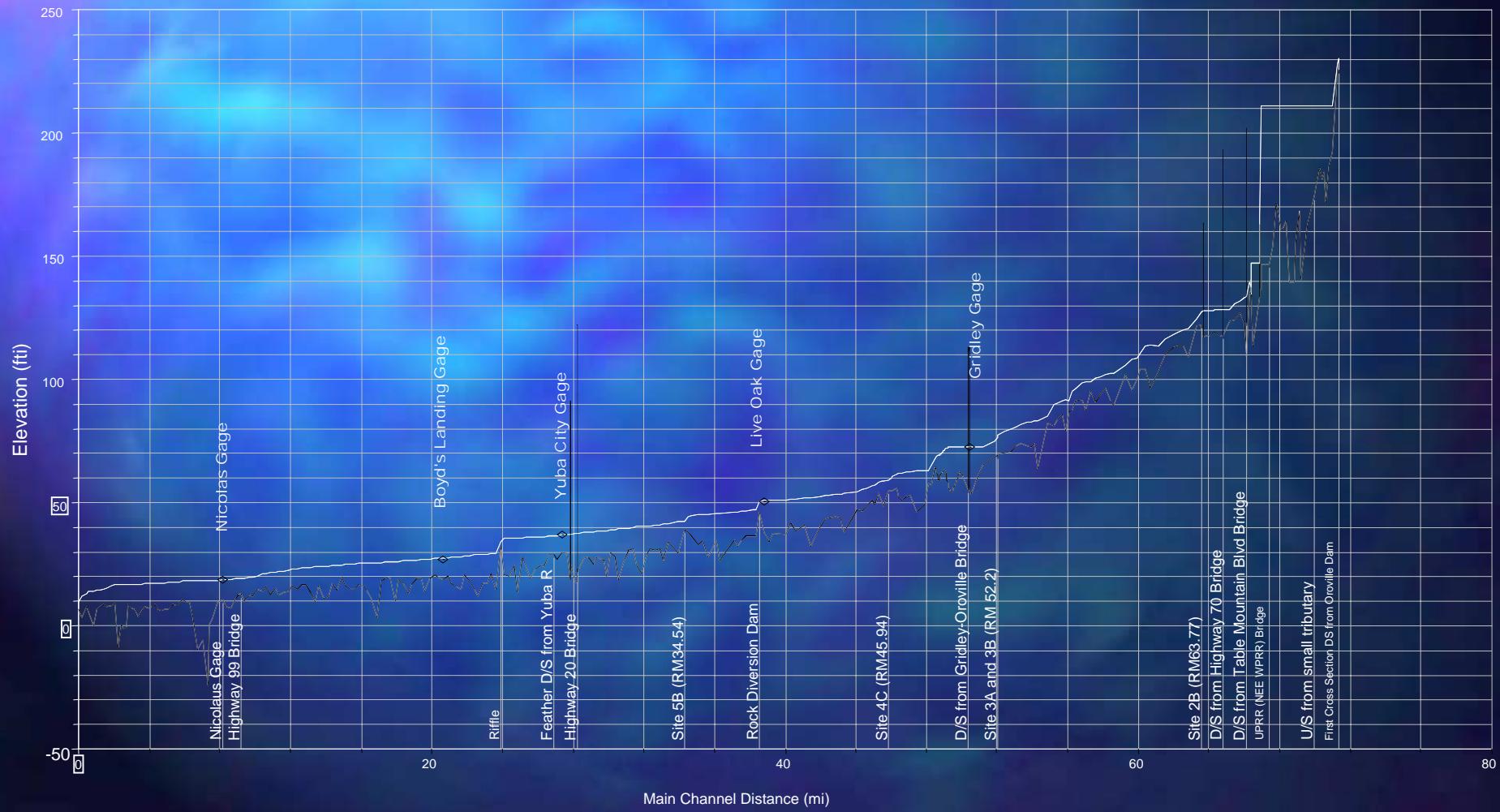
# Model Calibration

- Four Calibration runs
  - 2,000 cfs
  - 4,000 cfs
  - 6,000 cfs
  - 10,000 cfs
- Adjusting Manning's n roughness coefficients
- Rock diversion weir at RM 38.76
- Riffle below Yuba City gage
- Modifying channel geometry

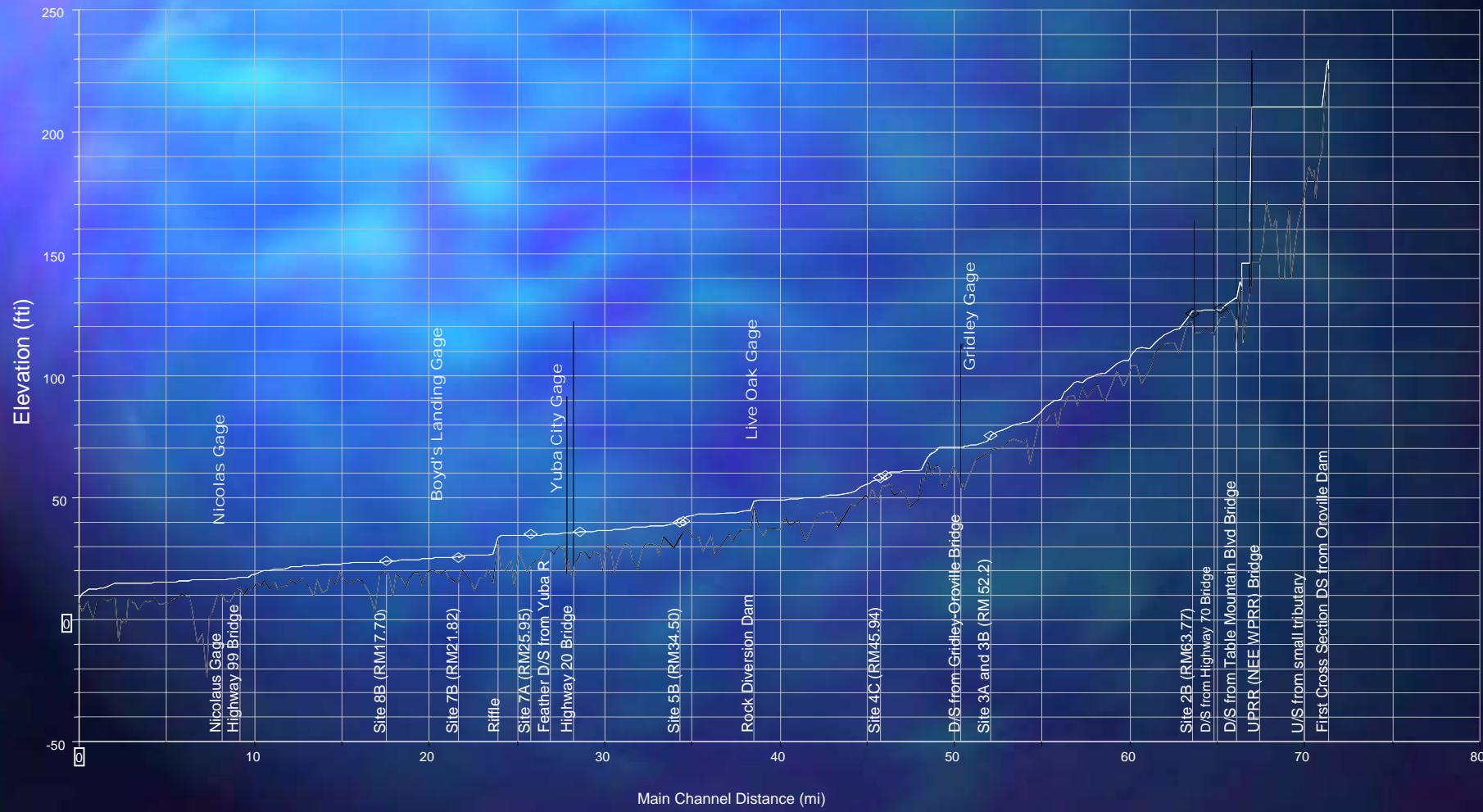
# Calibration Results

Calibration Runs		Gridley Gage RM 50.64	Live Oak Gage RM 38.99	Yuba City Gage RM 27.5	Boyd's Landing Gage RM 20.75	Nicolaus Gage RM 8.25
2000-cfs Run	Model Calculated Stage (feet)	71.02	48.96	35.88	26.31	17.42
	Recorded Stage (feet)	71.36	48.99	35.84	25.86	17.47
	<b>Diff. (feet)</b>	<u>-0.34</u>	<u>-0.03</u>	<u>0.04</u>	<u>0.45</u>	<u>-0.05</u>
4000-cfs Run	Model Calculated Stage (feet)	72.76	50.61	36.95	27.48	18.64
	Recorded Stage (feet)	72.55	50.61	36.95	27.1	18.59
	<b>Diff. (feet)</b>	<u>0.21</u>	<u>0</u>	<u>0</u>	<u>0.38</u>	<u>0.05</u>
6,000-cfs Run	Model Calculated Stage (feet)	73.63	51.85	37.97	29.67	20.94
	Recorded Stage (feet)	73.55	52	38.49	29.1	20.39
	<b>Diff. (feet)</b>	<u>0.08</u>	<u>-0.15</u>	<u>-0.52</u>	<u>0.57</u>	<u>0.55</u>
10,000-cfs Run	Model Calculated Stage (feet)	76.93	56.02	43.24	38.22	33.69
	Recorded Stage (feet)	76.11	55.91	43.57	37.88	34.08
	<b>Diff. (feet)</b>	<u>0.82</u>	<u>0.11</u>	<u>-0.33</u>	<u>0.34</u>	<u>-0.39</u>

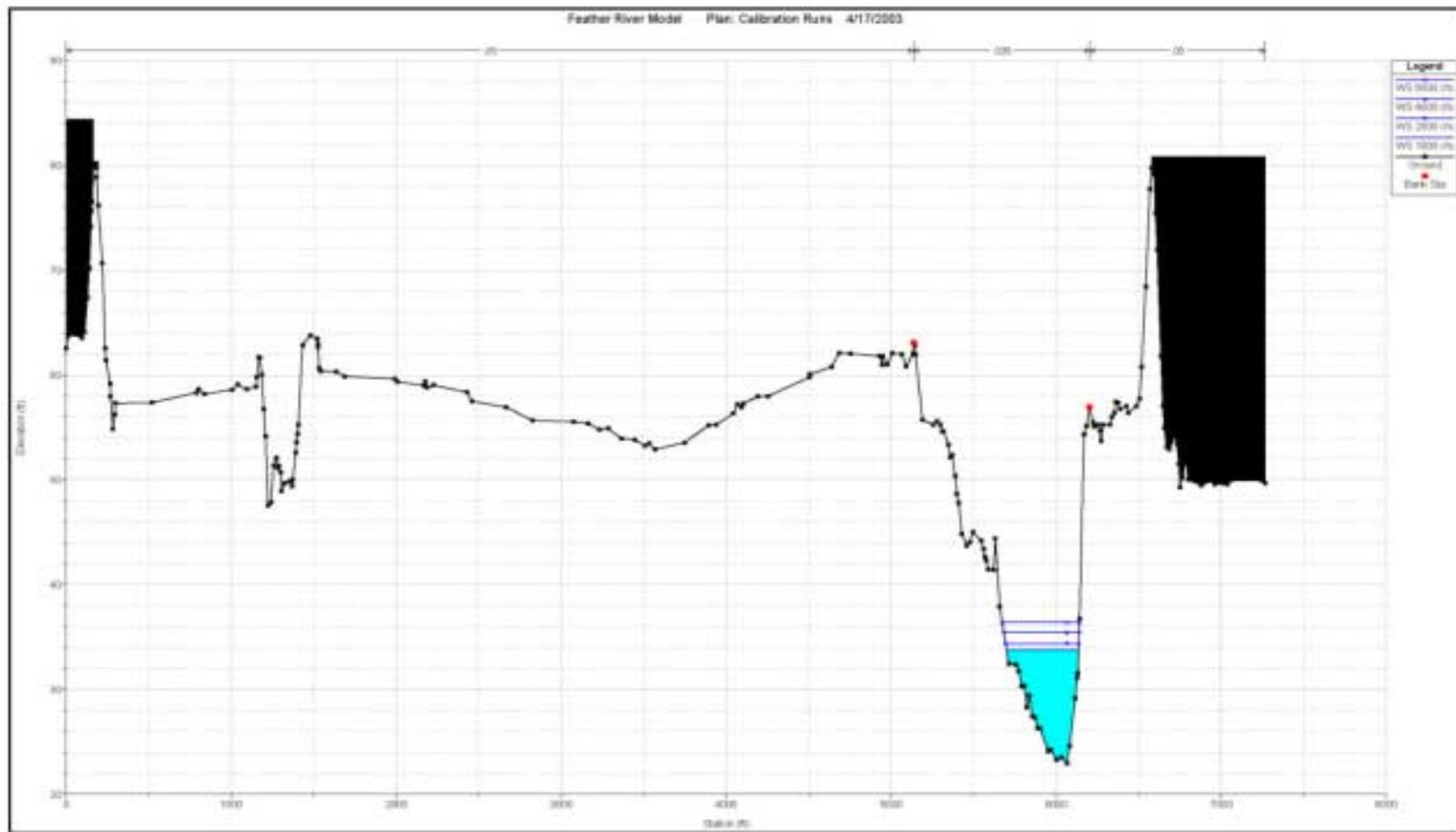
# 2,000 cfs Calibration Run



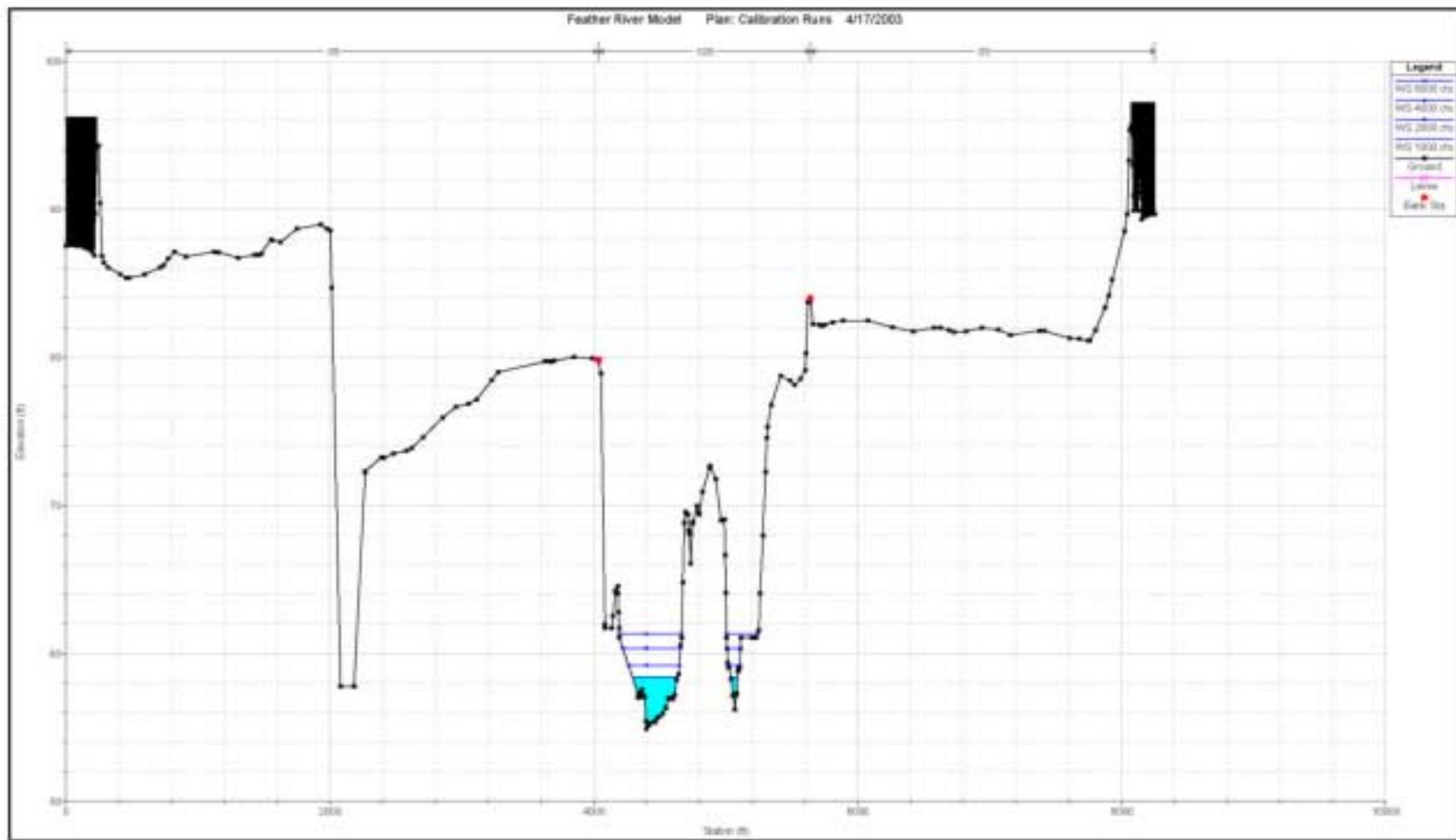
# Validation Run



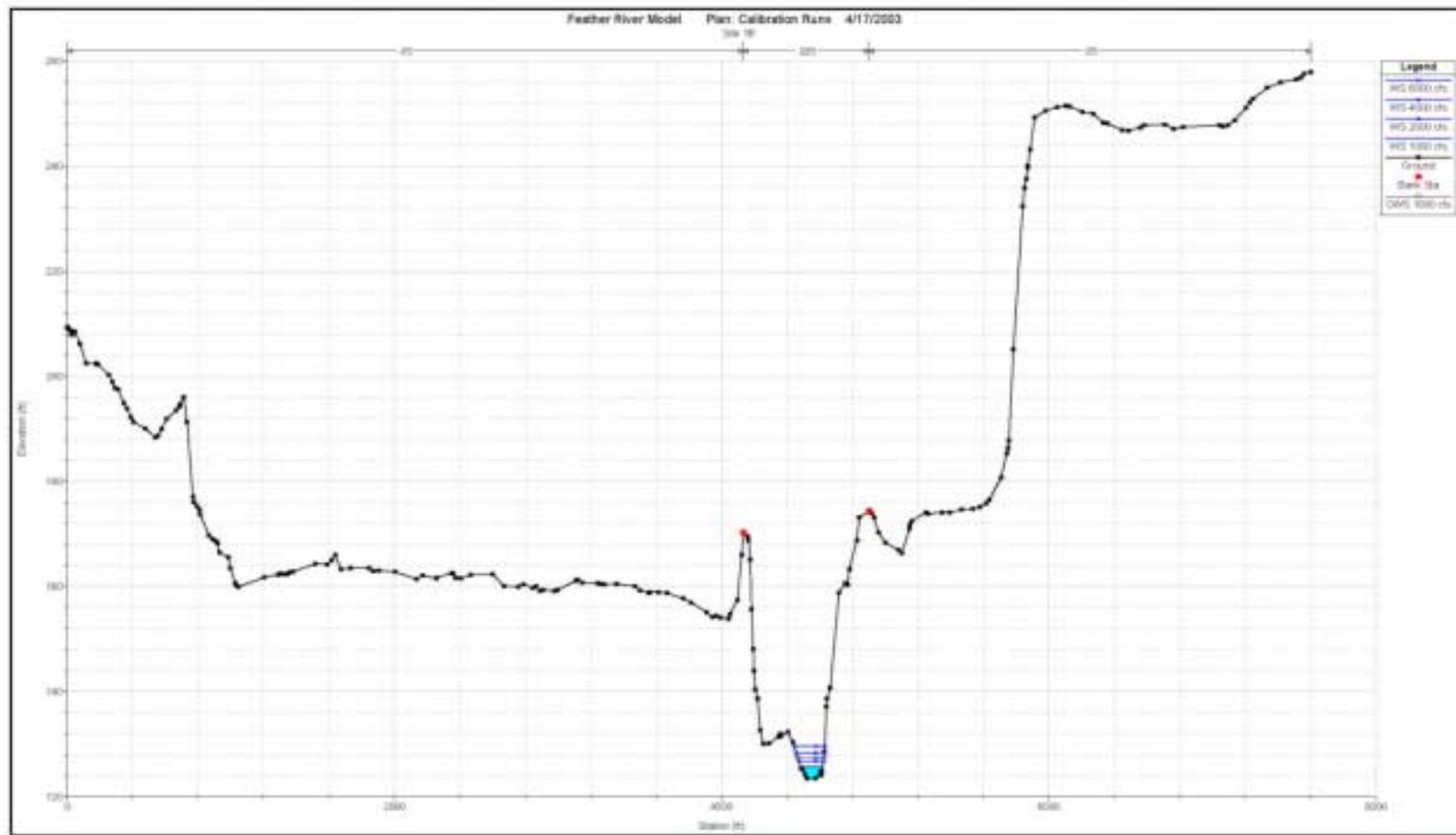
# Rivermile 26.00



# Rivermile 46.25



# Rivermile 65.33



# Summary

- Stand-alone flow-stage model for Feather River
- Computed river stages compared well with river gages for 4 flows from 2,000 cfs to 10,000 cfs.
- Model can produce flow-stage rating curves at location along the river
- Low flows in the upper Feather River (above Gridley gage) may result in stage predictions that vary from actual stages in that reach